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SKADDEN, ARPS, SLATE, MEAGHER & FLOM LLP

1440 NEW YORK AVENUE, N.W.
WASHINGTON, D.C. 20005-2111

TEL: (202) 371-7000
FAX: (202) 393-5760
<http://www.skadden.com>

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DIRECT FAX
202 661-9022

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July 6, 2000

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FEDERAL COMMUNICATIONS COMMISSION
OFFICE OF THE SECRETARY

The Honorable William E. Kennard
Chairman
Federal Communications Commission
445 12th Street, S.W.
Washington, D.C. 20554

Re: Ex Parte Submission of BroadwaveUSA and
Northpoint Technology, Ltd.
ET Docket Nos. 980206, RM-9147, RM-9245

98-206

Dear Chairman Kennard:

Northpoint Technology, Ltd. and BroadwaveUSA (collectively "Northpoint") respond to the May 1, 2000 ex parte filing by The Boeing Company ("Boeing").¹ Boeing has once more attempted to demonstrate to the Commission that Northpoint's proposed terrestrial service in the 12.2-12.7 GHz band would cause harmful interference into Boeing's proposed non-geostationary orbit fixed satellite service ("NGSO FSS") system.

In the Boeing Letter as well as in several other ex parte filings with the Commission, Boeing has asserted that it cannot share spectrum with Northpoint's proposed system. Boeing also indicated that it has great difficulty sharing spectrum

¹ Ex Parte Presentation of the Boeing Company ("Boeing Letter") dated May 1, 2000. This letter is accompanied by a "Northpoint Analysis" ("Attachment").

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with the other NGSO applicants and stated that dividing the 11.7-12.7 GHz band into two segments of 500 MHz each would be an acceptable solution.²

Northpoint and Boeing can therefore coexist if the Commission were to assign Boeing to 11.7-12.2 GHz and assign Northpoint to 12.2-12.7 GHz. Boeing would be able to reach 100% of its service area in the 11.7-12.2 GHz band and Northpoint would be able to reach 100% of its service area in the 12.2 - 12.7 GHz band.³

Boeing also admitted that it had made certain errors analyzing Northpoint's proposed system that resulted in significantly overstating the expected "mitigation areas" where procedures would be implemented to deal with possible interference into Boeing's proposed NGSO FSS system. Northpoint has repeatedly demonstrated to the Commission and to proponents of NGSO FSS systems that, despite the existence of such mitigation zones in some portions of the 11.7-12.7 GHz band, the use of interference mitigation techniques would facilitate successful spectrum sharing between Northpoint's system and the NGSO FSS systems as well as among the NGSO systems.

Unfortunately, the Attachment to the Boeing Letter contains additional errors. In this letter and the attached technical annex, Northpoint seeks to correct some of Boeing's errors and demonstrate that Northpoint's proposals would facilitate sharing in the 11.7-12.7 GHz band.

Thus, notwithstanding its correction of past errors, Boeing's continuing claims that Northpoint's proposed service will cause unacceptable interference into NGSO FSS networks are unfounded and based on flawed technical analysis.

² Boeing Letter at p. 2. In its application, Boeing sought 1000 MHz of spectrum (*i.e.*, the entire 11.7-12.7 GHz band).

³ See Ex Parte Submission of Northpoint Technology, Ltd. dated March 22, 2000, ET Docket No. 98-206, RM-9147, RM-9245.

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Six copies of this submission are being filed with the Commission Secretary for inclusion in the public record for the above-captioned proceedings. Please direct any questions concerning this submission to the undersigned.

Respectfully submitted,

A handwritten signature in black ink, appearing to read "David H. Pawlik". The signature is fluid and cursive, with a large initial "D" and a long, sweeping underline.

David H. Pawlik
Counsel for Northpoint Technology, Ltd.

Technical Annex

Introduction

The purpose of this annex is to correct the errors contained in submissions by The Boeing Company (“Boeing”) and to demonstrate that a sharing solution exists between the systems proposed by Northpoint Technology, Ltd. (“Northpoint”) and Boeing.

Appropriate Interference Criterion

Boeing originally argued that it needed protection for its proposed system to an interference-to-noise (“I/N”) level of -19.4 dB, or 1.0 % of system noise.¹ Using this criterion, Boeing claimed that there would have been unacceptable interference in 3.5% of the Northpoint service area. However, Northpoint demonstrated that there was no support for Boeing’s desired protection level and that Boeing’s calculations were in error. Boeing admits that it made a 4 dB error in the I/N and that an I/N of -15 or -16 dB would be sufficient to protect its system. Thus, Boeing now claims that interference could be expected within 2.1 km of a Northpoint transmitter, less than 1.6% of Northpoint’s service area. Northpoint’s calculations, however, show a mitigation zone for Boeing that is approximately 200 meters in size, an area comprising less than 0.1% of the Northpoint service area.

Boeing proposes that ITU R Recommendation S.1323 be used as a basis for both the method and the criteria for calculating interference into its system. Yet Boeing’s reliance on S.1323 is fundamentally flawed. S.1323 explicitly states that it is to be used for interference from co-frequency, co-directional satellite systems *only*, and not for sharing with other services. Although the methodologies referenced in S.1323 may be modified for calculating some interference statistics, the interference criteria are not applicable for calculating possible interference with NGSO FSS systems by terrestrial systems.

¹ See Boeing “Analysis of Interference Characteristics of Northpoint Technology, Ltd.,” February 16, 2000 at p. 5.

In addition, Boeing misquotes Northpoint by stating that, “Northpoint proposed to use a constant 6% $\Delta T/T$ plus an additional 10% increased unavailability on top of that.”² As Northpoint previously explained,³ and consistent with ITU-R recommendations, FSS systems should allocate at least 6% of their total noise budget for sharing with other co-primary services. This is equivalent to an I/N of -12.2 dB. For time-varying sources of interference, this interference can be translated to an I/N mask, where the I/N may vary as high as 0 dB or even higher for short periods of time.

There are other errors in the Boeing-proposed interference criterion. Boeing originally argued that an I/N of -19 dB is required to protect its system. As previously mentioned, Boeing now claims that an I/N of -15 or -16 dB is necessary to protect its system.⁴ The contributions (from the U.S. and others) to ITU Working Party 4-9S, dealing with sharing between FS and FSS systems indicated that NGSO FSS should only be protected to an I/N of -12.2 dB.⁵ Furthermore, a draft new ITU Recommendation provides guidance to Boeing and NGSO FSS designers and specifies that an I/N of -12.2 dB would be more appropriate as a steady-state interference criterion.

² See Ex Parte Presentation of the Boeing Company (“Boeing Letter”) dated May 1, 2000, accompanied by a “Northpoint Analysis” (“Attachment”), Attachment at p. 1.

³ See Ex Parte Submission of Northpoint Technology, Ltd. dated March 22, 2000, ET Docket No. 98-206, RM-9147, RM-9245 (“March Filing”).

⁴ See *id.* at p. 3.

⁵ See 4-9S/81-E, “Interference from Fixed Service Transmitters into NGSO Fixed-Satellite Earth Station Receivers at 18.8 - 19.3 GHz,” Canada, 21 September 1998, and Document 4-9S/54-E, 21 September 1998, “An Analysis of the Potential Interference from Point-to-Point FS Transmitters into NGSO FSS Earth Station Receivers Operating in the 18.8-19.3 GHz band,” The United States of America.

Availability Objectives and C/N Degradation

Boeing readily admits that “there was an error in the rain model calculation . . . in the Boeing analysis.”⁶ Yet, despite this admission, Boeing once again produces a faulty analysis to support its claim of a required separation distance or an “exclusion zone” of 2.08 kilometers for co-frequency operations.⁷ This separation distance would be equivalent to less than 1.6% of the Northpoint service area. The actual required separation distance for co-frequency operations is 0.2 to 0.3 km which is equivalent to only 0.1% of the Northpoint service area. Inside an area of 0.1%, frequency diversity, satellite diversity (which Boeing asserts it cannot perform), or another form of mitigation is required for co-frequency operations. Boeing operations in the band 11.7 – 12.2 GHz are unaffected, and therefore Boeing can provide service to 100% of its customers, no matter where they are located. In either case (1.6% or 0.1% mitigation zone), no undue burden is placed upon Boeing.

Polarization Isolation

In its technical analysis, Boeing claims that it is inappropriate for Northpoint to claim polarization isolation between its transmit antenna and the Boeing receive antenna.⁸ Citing to figure 8 of Appendix 30 of the Radio Regulations (“Figure 8”), Boeing asserts that because Northpoint uses a circular polarization, no polarization isolation would occur in the far sidelobes for the types of antenna being used for the Boeing earth station.⁹ Although Boeing’s technical analysis is correct, its analysis is

⁶ See Boeing Letter, Attachment at p. 2.

⁷ See Boeing Letter, Attachment at p. 3, Table 2. As demonstrated in Section 2.2 of Northpoint’s March Filing, the system that Boeing proposed in its applications cannot meet its stated availability objectives. The recalculation of these numbers in the Attachment to the Boeing Letter is similarly not based on actual availability in the designated region. Accordingly, the calculations Boeing used to analyze separation distance are not accurate.

⁸ See Boeing Letter, Attachment at p. 5.

⁹ It is generally accepted that there is no polarization isolation between left- and right-hand circular polarizations in the back lobes of an antenna because a signal seen as left-handed when entering the front of the antenna would be
(continued...)

inapplicable to the Northpoint polarization isolation model. Northpoint does not use, as Figure 8 demonstrates, a left- and right-hand circular polarization. Instead, it uses a range of horizontal and vertical and circular polarizations. Accordingly, the conclusions reached in Figure 8 regarding circular polarizations are not true of a linear-circular polarization. In fact, a linear polarized wave can be converted to circular polarization if it passes through a circular polarizing filter, such as a grid of quarter-wave plates.¹⁰ Accordingly Northpoint's claim of polarization isolation of 3 dB between its horizontal polarized transmission and the Boeing circularized receive antenna is appropriate.

Receiver Noise Temperature

Boeing admits that its prior analysis regarding the receiver noise temperature was different from its analysis in its application. It further claimed that the "insignificant difference" resulted in an error in its calculations of 0.03 dB that does not influence the unavailability calculation.¹¹ To the contrary, a 0.03 dB difference is approximately one-third of the 0.10 dB of the C/N degradation that Boeing claims is required to protect its system.

Frequency Diversity is not Band Segmentation

Boeing does not deny that frequency diversity will mitigate 100% of interference. Instead, Boeing merely equates this mitigation technique to band segmentation, and stated that frequency diversity would reduce the spectrum available to NGSO applicants. This conclusion is not based on sound technical analysis. Frequency diversity is not band segmentation. As documented repeatedly by Northpoint in this proceeding, frequency diversity will allow Boeing to have

⁹ (...continued)
seen as right-handed when entering from the opposite direction. This is not true for linear-circular polarizations.

¹⁰ See "Antennas", L.V. Blake, Artech House, Inc. 1984, pp. 329.

¹¹ See Boeing Letter, Attachment at pp. 4-5.

access to the full spectrum, and would allow for NGSO operation without undue burden on NGSO FSS systems.¹²

Summary

Although Boeing corrected some earlier errors, it continues to make many of the same mistakes. Boeing once again overestimates the size of its mitigation zone and mistakenly relies on inapplicable ITU-R Recommendations to develop its interference criterion. As Northpoint has shown, frequency diversity and other effective mitigation techniques are available. Moreover, Northpoint's proposed sharing techniques will be fully effective in mitigating any potential interference near a Northpoint transmitter without placing an undue burden on either the Boeing system or the Northpoint system.

¹² Frequency diversity is a mitigation technique whereby the band 11.7-12.2 GHz would be used by NGSO FSS systems to serve customers in the mitigation zone.